REMARKS

The Examiner has rejected claim 7 under 35 USC 102(b) as being anticipated by Araki et al. In rejecting the claims, the Examiner urges that claim 7 is anticipated by Araki et al. since Araki et al. disclose a process and the welding wire obtained from the process wherein the wire is subjected to an optimal heat treatment in order to modify the hardness. In this regard the Examiner notes that the wire of Araki et al. is drawn to 2 to 4mm in diameter with a hardness of the outer skin controlled to a Vickers Hardness of 180 to 250 Hv. The Examiner also notes that the raw wire has a hardness of 150 to 250 Hv.

The Examiner has also rejected claims 5, 6 and 8 under 35 USC 103(a) as being unpatentable over this same reference. In rejecting the claims the Examiner acknowledges that Araki et al. does not disclose the hardness difference required by applicants' claims. However, the Examiner urges that the cited reference discloses a product substantially similar to the claimed product, differing only in the manner by which it is produced. The Examiner therefore urges that it would be obvious for one skilled in the art to produce the claimed wire having the hardness difference characteristics recited in applicants' claims.

Before discussing the above issues raised by the Examiner, applicant first wishes to thank the Examiner for the courtesy extended to the below-signed attorney during the interview on February 19, 2004. The following comments constitute a separate record of the substance of the interview as well as additional comments in support of the patentability of applicants' invention.

It was agreed during the interview that one skilled in the art will understand from applicants' specification that the invention pertains to improving the wire feedability of a solid wire for arc welding by subjecting the wire to a wire drawing process wherein a hardness deviation of the wire is carefully controlled. In particular, the hardness deviation of the wire is adjustable by controlling the area in which the wire is in contact with dies used in the wire drawing process. The hardness deviation in claims 5, 6 and

8 between a central portion and an outer surface of the wire is less than 18 and a hardness difference between portions of the wire at intervals of 200mm in the longitudinal direction is less than 15 (Vickers Hardness). As noted during the interview, it is clear that the invention pertains to the drawing of solid wire, not a flux-cored wire. In this regard it is to be noted that the drawings illustrate a cross-section of the wire which does not illustrate any core therein.

In both of the rejections, the Examiner relies upon the teaching of Araki et al. However, as noted during the interview, Araki et al. pertains to a process for manufacturing seamless flux-cored welding wire; and thus does not pertain to solving the feeding problems associated with solid weld wires. It was agreed that amending the claims so that they are directed toward a solid wire material will overcome all of the rejections based on this reference.

Accordingly, all of the claims have been amended so that they now recite a solid wire material. Thus it is self-evident that the claims are now fully distinguished over the solid reference.

With respect to the obviousness rejection of claims 5, 6 and 8. Applicant submits that these claims are further distinguished over the cited reference in view of the comparative data in the specification which clearly demonstrates unexpected benefits relating to improved feedability of the wire when the selected hardness differences recited in claims 5, 6 and 8 are produced in the wire. In this regard the Examiner's attention is directed toward the comparative tests described in applicants' specification which are summarized in Table 1 on page 8 of the specification. The Examiner's attention is also directed to the first full paragraph on page 10 and the first paragraph on page 11 of the specification wherein the data of Table 1 is discussed.

As noted in the specification, in a welding test of the wire, the arc becomes unstable when the feeding load is about 2.1 (see page 11, lines 1-2). Examples 1, 2 and 4 show that when the hardness deviation of the wire is within the claimed range of claims 5, 6 and 8, the feeding load is less than 2.1. However, when one of the two

claimed hardness deviations is exceeded, as in Examples 3 and 5, the feeding load is 2.1 or higher. Furthermore, when both of the hardness deviations are exceeded, the feeding load is substantially increased as shown in comparative Examples 6-9.

The Examiner acknowledges that Araki et al. fails to specifically disclose the selected range of hardness differences between the central portion and the outer surface of the wire and the hardness difference in the longitudinal direction. At best, Araki et al. only disclose a very broad range in hardness between the outer portion of the wire and an inner portion of the wire when can be calculated from the hardness of the raw wire and the hardness of the outer skin.

Applicants submit that in order to establish a prima facie case of obviousness, the Examiner must show why it would be obvious to select each of the characteristics of applicants' invention, including the characteristic which requires a hardness difference in the longitudinal direction of less than 15. The Examiner has not made a finding of face regarding the disclosure of Araki et al. with respect to this particular hardness difference. Thus, applicants submit that the Examiner has failed to establish a case a prima facie obviousness on this basis alone.

Furthermore, even if the Examiner is correct that the invention of claims 5, 6 and 8 is prima facie obvious over the cited reference, the above discussed comparative tests clearly rebut any such finding of obviousness. In this regard, applicants wish to remind the Examiner that comparative examples set forth in the specification overcome any presumption of obviousness when they demonstrate unexcepted results. Ex parte Drewe et al., 203 USPQ 1127. In addition, it is well settled that evidence in the specification must be considered when evaluating applicants' rebuttal of prima facie obviousness. In re Margolis, 228 USPQ 940.

It was also noted during the interview that the main objective of applicants' invention is to provide a process for manufacturing a welding wire having excellent feedability by uniformly distributing the residual stress of a solid wire for arc welding obtained after first drawing, heat treating, second drawing and heat treating,

sequentially. The distribution is carried out at the final drawing step. The enhancement of the feedability is accomplished by two sub-steps of the final drawing step, at which the wire is contacted with a first die and a second die.

The reasons for dividing the final drawing step into two sub-steps is to allow the wire to obtain a hardness deviation of less than 18 Hv between the central portion and the surface along a cross-sectional direction of the wire, and to obtain a hardness deviation of less than 15 Hv at fixed intervals in a longitudinal direction of the wire. These hardness deviations can be adjusted by limiting a contact area ratio to 3-3.5, which is fully supported by the detailed description of applicants' invention.

In contrast, the object of Araki et al. is to provide a process for manufacturing a flux-cored welding wire for low-hydrogen welding by dehydrogenation, in order to solve problems caused by welding wires containing a large amount of hydrogen. In addition, the technical feature of Araki et al. is to define optimum annealing and drawing conditions for dehydrogenation. Thus, the present invention is highly distinguished from Araki et al. both in terms of objectives and technical features.

Applicants' invention pertains to a solid wire for arc welding which has a hardness deviation of less than 18 Hv between the central portion and the surface along the cross-section of the wire, and a hardness deviation of the less than 15 Hv at an interval of 200mm in a longitudinal direction of the wire. However, the hardness ranges (180 - 250 Hv and 150-250 Hv) described by Araki et al. represent those of the outer skin measured before and after drawing. Thus, Araki et al. does not teach the hardness deviation measured between the central portion and the surface along a cross-sectional portion of the wire and also does not disclose a hardness deviation measured at fixed intervals along the longitudinal direction of the wire. In addition, the welding wire manufactured by Araki et al. is a flux-cored welding wire comprising a sheath packed with flux. Therefore, it is clear to one skilled in the art that it is meaningless to directly compare the hardness deviations along the cross-section of a wire for arc-welding described in applicants' invention with the hardness ranges of a flux-cored welding wire described by Araki et al.

As discussed above, enhancement in the feedability of the welding wire according to applicants' invention is accomplished by controlling the hardness deviation along the cross-section of the wire and the hardness deviation along the longitudinal direction of the wire. In contrast, Araki et al. disclose drawing and annealing processes for dehydrogenation and furthermore, the hardness ranges described by Araki et al. simply represent those of the outer skin measured before and after drawing. Therefore, it is self-evident that applicants' invention is novel and unobvious over Araki et al.

In view of the above arguments, further amendment to the claims and the agreement reached with the Examiner during the interview, applicants respectfully request reconsideration and allowance of all of the claims which are currently pending in the application.

Respectfully submitted,
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Dated: March 9, 2004

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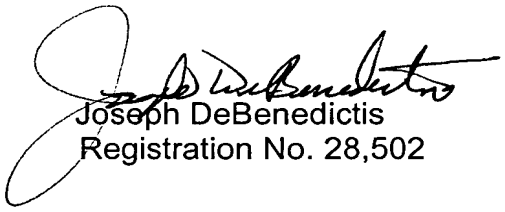

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